Basic Calculus Fact Sheet

Essential Derivative Rules

$\frac{d}{dx}\left(x^n\right) = nx^{n-1}$	$\frac{d}{dx}\left(\ln(x)\right) = \frac{1}{x}$
$\frac{d}{dx}\left(e^x\right) = e^x$	$\frac{d}{dx}\left(a^x\right) = a^x \ln(a)$
$\frac{d}{dx}\left(\sin(x)\right) = \cos(x)$	$\frac{d}{dx}\left(\cos(x)\right) = -\sin(x)$
$\frac{d}{dx}\left(\tan(x)\right) = \sec^2(x)$	$\frac{d}{dx}\left(\cot(x)\right) = -\csc^2(x)$
$\frac{d}{dx}\left(\sec(x)\right) = \sec(x)\tan(x)$	$\frac{d}{dx}\left(\csc(x)\right) = -\csc(x)\cot(x)$
$\frac{d}{dx}\left(\tan^{-1}(x)\right) = \frac{1}{x^2+1}$	$\frac{d}{dx}\left(\sin^{-1}(x)\right) = \frac{1}{\sqrt{1-x^2}}$
$(fg)' = fg' + f'g$	$\left(\frac{f}{g}\right)' = \frac{gf' - fg'}{g^2}$
$[f(g(x))]' = f'(g(x))g'(x)$	

Essential Antiderivative Rules

$\int x^n\,dx = \frac{1}{n+1}x^{n+1} + C$	$\int \frac{1}{x}\,dx = \ln\lvert x\rvert + C$
$\int e^x\,dx = e^x + C$	$\int a^x\,dx = \frac{1}{\ln(a)}a^x + C$
$\int \cos(x)\,dx = \sin(x) + C$	$\int \sin(x)\,dx = -\cos(x) + C$
$\int \sec^2(x)\,dx = \tan(x) + C$	$\int \csc^2(x)\,dx = -\cot(x) + C$
$\int \sec(x)\tan(x)\,dx = \sec(x) + C$	$\int \csc(x)\cot(x)\,dx = -\csc(x) + C$
$\int \frac{1}{x^2+1}\,dx = \tan^{-1}(x) + C$	$\int \frac{1}{\sqrt{1-x^2}}\,dx = \sin^{-1}(x) + C$

Some Basic Precalculus That You'll Always Need

$\sin^2(x) + \cos^2(x) = 1$	$\tan^2(x) + 1 = \sec^2(x)$	$1 + \cot^2(x) = \csc^2(x)$
$\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$	$\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$	$\sin(x)\cos(x) = \frac{1}{2}\sin(2x)$

$\ln(1) = 0$	$\ln(e) = 1$	$\ln(a^b) = b\ln(a)$	$\ln(ab) = \ln(a) + \ln(b)$
$x^a x^b = x^{a+b}$	$(x^a)^b = x^{ab}$	$\sqrt[n]{x} = x^{1/n}$	$\frac{1}{x^a} = x^{-1}$

x	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin(x)$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos(x)$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
$\tan(x)$	0	$1/\sqrt{3}$	1	$\sqrt{3}$	undefined

Other skills: Be able to extend this table to the 2nd, 3rd and 4th quadrants of the unit circle.